REMARKS

The application includes claims 1-13 and 18-29 prior to entering this amendment.

The Applicant amends claims 1, 6, 8, 9, 12, and 28. No new matter is added.

The application remains with claims 1-13 and 18-29 after entering this amendment.

Summary of Telephonic Examiner Interview

Applicant's attorney spoke with Examiner Vo on August 6, 2009 to discuss the basis for rejection of claims 1-13 and 18-29. Examiner Vo indicated that each of the luminance and chrominance channels (Y, Cb, and Cr) of the Maurer reference were being interpreted by the Examiner as disclosing separate color elements. Examiner Vo and Applicant's attorney were unable to reach any agreement on the allowability of the claims. Applicant's attorney next spoke with Examiner Vo and Examiner Moore on August 14, 2009 to discuss the Maurer reference (U.S. Patent 6,650,773). No agreement was reached.

Claim Rejections - 35 U.S.C. § 101

The Examiner rejected claims 1-13 and 26-29 under 35 U.S.C. § 101.

Without admitting the propriety of the rejection, Applicant amends claims 1, 6, 8, 9, 12, and 28 to expedite prosecution, and without prejudice with regard to pursuing the claims as previously presented or in other forms in a continuation or other application. Specifically, claims 1, 6, and 8 are amended to recite that the method is "computer-implemented" to tie the method to another statutory category, and to recite that a scanner scans the image. Accordingly, withdrawal of the rejection of claims 1-13 and 26-29 is respectfully requested.

Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1-5, 22 and 26-27 under 35 U.S.C. § 102(e) over Maurer, et al. (U.S. Patent 6,650,773).

The rejection is traversed. Claim 1, as amended, recites a computer-implemented method for reducing image noise in a scanned image, comprising:

> scanning an image with a scanner to obtain a color level of a color element of a pixel of the scanned image;
>
> decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image;

composing a pattern comprising the color element having less color level than the full color level; and

restoring the full color level of the color element by combining the reduced color level image with the pattern.

Maurer, on the other hand, is primarily directed to a disparate method of compression of a digital image (Abstract and col. 1 lines 8-10). In Maurer, the digital image is pre-processed and converted into a YCbCr color space 102 prior to subsequent compression of the different color channels 109, 112. The pre-processing is described as removing random noise such as Guassian noise and "salt and pepper" noise of the image. The pre-processing of Maurer is an example of reducing image noise that is known in the art, and as further described in Applicant's specification at paragraph 0007 of the published application.

Separate operations performed on different color channels are not combinable in the proposed manner.

In rejecting claim 1, the Examiner identified that each of the luminance and chrominance channels are associated with different color elements of the image (page 5, first four lines, and also Examiner's comments with respect to the rejection of claims 9 and 26). According to Maurer, each color channel is processed separately from the other color channels (col. 2, lines 31-32).

Despite the above, the Examiner argued that a reduced color level image of Maurer's luminance channel is combined with a 2x2 downsampling matrix of Maurer's chrominance channel (page 4, last 5 lines to top of page 5, first 10 lines). The Examiner appears to be arguing that such a combination is inherent since both the luminance channel and chrominance channel combine to form the complete image, and hence the effect of the combined color channels provides the color level of the complete image. However, this is clearly distinguishable from the features of claim 1, which recites *restoring the full color level of the color element by combining the reduced color level image with the pattern*. Since the Examiner has already acknowledged that each of the color channels in Maurer disclose a different color element, it would be improper to suggest that combining processes of multiple color elements would somehow result in restoring a full color level of one color element. The color level of Maurer's chrominance channel is unrelated to the color level of Maurer's luminance channel, since both are processed separately (col. 2 lines 30-32).

A combination of the bit-depth truncation 106 and downsampling process 108 is not only incongruous with the processing of the color channels being separately performed by Maurer, but does not logically follow since Maurer's 2x2 downsampling matrix of the chrominance channel is comprised of pixels and fails to identify or otherwise indicate any relationship to a number of bits reduced in the bit-depth truncation 106 of the luminance channel. Maurer fails to disclose how the reduced number of bits in the luminance channel is related to the matrix of pixels in the chrominance channels in the downsampling process 108, or more specifically, how the bit-depth truncation 106 and downsampling process 108 could be combined to restore a full color level of a color element. Accordingly, Applicant respectfully submits that the proposed combination of the processes 106, 108 is improper, and is furthermore not obvious in view of Maurer which in fact teaches away from such a combination (col. 2 lines 30-32).

Applicant further points out that any color loss that occurs during the pre-processing of the image of Maurer (col. 2 lines 15-30) would not be recovered by reconstruction (col. 3 lines 38-46). Rather, these lossless and lossy reconstruction standards are only purported to reconstruct the color channels due to data loss associated with the bit-depth truncation 106 and downsampling 108 processes. However, as both of these processes 106, 108 occur after the pre-processing step, color loss associated with the noise reduction would not be recovered. This further serves to illustrate that Maurer merely discloses conventional image noise reduction as provided in the Applicant's specification at page [0007] of the published application.

<u>The 2x2 downsampling matrix fails to disclose a pattern comprising the color element having less color level than the full color level</u>.

The Examiner identified the downsampling process 108 of Maurer as allegedly disclosing a pattern having less color level than the full color level, as recited by claim 1. A 2x2 matrix of pixels of the downsampling process 108 is purported to disclose the pattern of claim 1. Applicant respectfully submits that there is no basis for the Examiner's position, and that Maurer does not provide any indication of a relative color level of the 2x2 matrix.

At page 5, lines 4-5 of the Office Action, the Examiner stated that the luminance channel is bit-depth truncated, and therefore the color level is reduced. Even assuming for argument's sake this is true, this has no bearing on a color level of the 2x2 downsampling matrix of the chrominance channel. The 2x2 downsampling matrix is not bit-depth truncated, rather according

to Maurer at column 2, lines 58-59 "the downsampling reduces spatial resolution of the chrominance channels, but not bit depth." A reduction of spatial resolution does not necessarily suggest any reduction in color level. Rather, a single pixel may have the same color level as a matrix of pixels. There is simply no support in Maurer to suggest that the 2x2 downsampling matrix has any less color level than a reconstructed chrominance channel. To the contrary, according to Maurer, a compression of the chrominance channels may not result in any loss of color information (col. 3 lines 5-7). If there is no loss in color from the compression of the chrominance channel, it would appear contrary to logic to later add color to the restructured chrominance channel since this would result in an overall increase in color from the original.

A reduction in resolution fails to disclose a reduced color level.

The Examiner stated at page 5, lines 2-5, that a bit-depth reduction of the luminance channel results in a reduced color level of the luminance channel. Even assuming for argument's sake that this is true, Applicant respectfully submits that this is unrelated to the Examiner's apparent argument that a reduction in resolution is related to a reduction in color (page 5, lines 7-13). As previously indicated, the downsampling process of Maurer reduces the spatial resolution of the chrominance channels, but not the bit depth (col. 2, lines 58-59). Accordingly, even if the chrominance channels were reconstructed using the 2x2 blocks of pixels (col. 3 lines 37-43), this has no relationship to a bit-depth or color of the image. Rather, the reconstructed chrominance channels are merely interpolated to their original resolution (col. 3 lines 48-50).

The Examiner appears to be confusing the terms "bits" with "pixels." Whereas the bit-depth truncation 106 describes reducing a number of bits (col.2 lines 47-51), the downsampling process 108 describes reducing a number of pixels (col. 2 lines 62-64). Pixel count and pixel density may be used to define a resolution of an image (col. 2 line 59), whereas each pixel is associated with a number of bits of one or more colors (col. 2 lines 8-13). A reduction of pixels reduces a resolution of an image, whereas a reduction of a number of bits reduces an amount of data associated with defining the color. More to the point, the matrix of pixels associated with the downsampling process 108 of Maurer is unrelated to a color level of the color element vis-a-vis there being no change to a bit-level of the chrominance channel (col. 2, lines 59-60).

Applicant respectfully submits that the Examiner has failed to provide adequate basis for suggesting that the matrix of pixels associated with the downsampling process 108 is in any way

dependent or related to a number of bits associated with the luminance channel or with bit-depth truncation 106 in general. To the contrary, Maurer teaches away from any such interpretation (col. 2, lines 30-32 and col. 2 lines 58-60).

An interpretation of "visual artifacts" as including noise is inconsistent in view of Maurer.

The Examiner identified Maurer's reference to discarding visual contouring artifacts as disclosing a method for reducing image noise (page 4, final paragraph). Applicant respectfully submits that visual contouring artifacts do not suggest image noise, as recited by claim 1. Rather, the image noise is described as being reduced in the pre-processing step of Maurer. At column 2, lines 15-19, Maurer describes a pre-processing of the digital image to remove random noise, Guassian noise, and "salt and pepper" noise. Applicant respectfully points out that the optional pre-processing step occurs prior to any of the compression steps that form the majority of Maurer's specification (Fig. 1 and col. 2 lines 14-22). Furthermore, the compression steps may be completed independently of the pre-processing step (col. 2 lines 19-30), since they are directed to the different purposes of image compression versus removing noise.

Accordingly, Applicant respectfully submits that the Examiner's suggestion that the compression method of Maurer is directed to a method for reducing image noise is improper. Furthermore, the Examiner's assertion that he interprets noise to include contouring artifacts (page 4, final paragraph) is not controlling when Maurer himself has separately defined and treated these terms differently in the specification.

Dependent claims

In rejecting claim 2, the Examiner suggests that the bit-depth truncation 106 of Maurer discloses a bit-enhanced method to combine a reduced color level image and a pattern. Maurer describes bit-depth truncation 106 as truncating a number of bits, for example from eight bits to five bits. However, simply reducing a number of bits in a channel fails to disclose that a reduced color level image and a pattern are combined. The bit-depth truncation 106 is directed to the compression method of Maurer, wherein data is removed to provide for more efficient compression of the image. Any discussion of the 2x2 matrix (alleged by the Examiner as disclosing the pattern recited by claim 2) is not disclosed with reference to bit-depth truncation,

and one skilled in the art would appreciate that the bit-depth truncation of Maurer fails to disclose the bit enhanced method recited by claim 2. The Examiner appears to be confusing the separate operations performed on the chrominance channel with those performed on the luminance channel.

In rejecting claim 3, the Examiner stated that Maurer and Ide combine to disclose the features recited therein. Applicant respectfully submits that in an anticipation rejection it is improper to combine multiple references in any event.

In rejecting claim 4, the Examiner stated that the 2x2 downsampling pattern discloses a halftone pattern. Applicant respectfully submits that a 2x2 matrix of pixels does not necessarily disclose a halftone pattern, and that the Examiner has failed to meet the burden of identifying any relationship between a 2x2 matrix used to reduce resolution of the chrominance channel and a halftone pattern. A halftone pattern is generally unrelated to increasing or decreasing a spatial resolution of an image. Maurer himself states that the 2x2 pattern fails to change a bit-depth of the chrominance channel (col. 2, lines 58-60).

In rejecting claim 5, the Examiner stated that the number of bits reduced from the full color level is set to an image noise level, and cites column 2, lines 44-51. The bit-depth truncation 106 is directed to a method of compression, and is described as reducing contouring artifacts (col. 2 lines 45-48), rather than a method for reducing image noise. Image noise level reduction, on the other hand, is described by Maurer as being performed by the optional pre-processing step, wherein features are removed that take too many bits to code (col. 2 lines 15-20). Applicant respectfully submits that the Examiner is improperly combining features of multiple independent steps of Maurer that are not combinable in the manner proposed. Applicant traverses the rejection of claim 22 for similar reasons.

In rejecting claims 26 and 27, the Examiner suggested that the references to the RGB and/or YCbCr color spaces in Maurer disclose the three color elements recited therein. Applicant respectfully submits that since claim 1, upon which claims 26 and 27 depend, recites a color element, that the Examiner should therefore be able to identify which one of the Y, Cb, Cr, R, G, or B color elements discloses the color element recited therein. Instead, Applicant submits that the Examiner's recurring references to multiple color channels in Maurer instead indicate that the Examiner is improperly relying on multiple operations performed on multiple color elements in rejecting Applicant's claims 1, 26, and 27.

Accordingly, Applicant respectfully requests withdrawal of the rejection of claims 1-5, 22, 26, and 27.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claims 6-13, 18-21, 23-25 and 28-29 under 35 U.S.C. § 103(a) over Maurer et al. in view of Seroussi et al. (U.S. Patent 5,764,374).

The Examiner acknowledged that Maurer fails to disclose *wherein a number of rows and a number of columns of the matrix correspond to the number of bits of gray scale image data subtracted from the one or more pixels*, as recited by claim 6, and instead suggests that Seroussi discloses these features. Similar to Maurer, Seroussi is also directed to a method of image compression (col. 1, lines 18-21). The Examiner suggested that because Seroussi describes gray-scale as being considered a two-dimensional array of intensity values, that it would have been obvious to modify Maurer's 2x2 matrix of pixels corresponding to a number of bits of gray-scale image data that were subtracted. Whereas Seroussi discloses the well known concept of gray-scale, the combination of Seroussi with Maurer, as proposed by the Examiner, is only possible through the use of impermissible hindsight. According to MPEP 2142,

> To reach a proper determination under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention...However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

Even assuming a matrix of n x m bits was well known in view of Seroussi, Applicant respsectfully submits that there is no suggestion, motivation, or teaching in either Seroussi or Maurer for using such a matrix to increase a color level. Rather Maurer's 2x2 matrix is composed of pixels used in a downsampling operation that reduces a resolution of the chrominance level. According to Maurer, the number of pixels in the 2x2 matrix reflect the number of pixels in a block of pixels that are replaced with a single representative pixel (e.g. decreasing the resolution). If the number of pixels in the downsampling matrix were instead

replaced with a number of pixels equivalent to the number of bits subtracted from one or more pixels, there would no longer be any relationship of the downsampling matrix and the number of pixels in the pixel block which it is representing. According to the proposed combination, if the modified downsampling matrix were later added back to the chrominance channel, the resulting chrominance channel would then have a different resolution from its original resolution, which would be counterproductive to any compression operation such as those disclose in Maurer and Seroussi. Effectively, such a combination would be inoperable for the intended purpose. On the other hand, combining the teaching of Seroussi with Maurer to teach the operable features recited by claim 6 would only be possible through the use of impermissible hindsight.

Claims 8 and 18 are believed to be allowable for at least some of the reasons provided above with respect to claim 6. In addition, claims 6, 8, and 18 are believed to be allowable for some of the reasons previously provided with respect to claim 1, particularly with regards to the rejection over Maurer. As claims 7, 9-13, 19-21, 23-25 and 28-29 depend from claim 6, 8, or 18, they are believed to be patentable over the art for at least the foregoing reasons, as well as for the further novel features recited respectively therein. Accordingly, withdrawal of the rejection of claims 6-13, 18-21, 23-25 and 28-29 is respectfully requested.

Any statements made by Examiner that are not addressed by Applicant do not necessarily constitute agreement by the Applicant. In some cases, Applicant may have amended or argued the allowability of independent claims thereby obviating grounds for rejection of the dependent claims.

CONCLUSION

For the foregoing reasons, the Applicant respectfully requests reconsideration and allowance of claims 1-13 and 18-29. The Examiner is encouraged to telephone the undersigned if it appears that an interview would be helpful in advancing the case.

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Respectfully submitted,

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